

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A ~~hologram retrieval method~~ for searching holograms comprising the steps of:

emitting a signal beam;

modulating the signal beam, by a spatial light modulator, ~~using a retrieval data page containing a data image to be retrieved;~~ using a search data page having a plurality of equally divided data blocks, at least one of the data blocks of the search data page consisting of an encoded search image;

irradiating the modulated signal beam onto a holographic recording medium having digital information recorded thereon ~~in the form of a plurality of data pages; pages, formed of a two dimensional bit map image;~~ each data page having a plurality of equally divided data blocks and being multiplexed to transmit a diffracted beam; ~~beam when irradiated by a light beam;~~

receiving one or more diffracted beams emitted from the holographic recording ~~medium;~~ medium in response to the modulated signal beam;

detecting a target diffracted beam having a maximum intensity of the one or more diffracted ~~beams;~~ beams; and

determining ~~a data image address~~ an address of the target diffracted beam as the ~~data image address of a target data page;~~ address of a target data page matching the search image,

~~wherein the data pages each include a plurality of equally divided data blocks;~~

a data image is formed within each data block of the recorded data pages by an encoding method that provides a certain number of ON ~~pixels;~~ pixels; and

~~the spatial light modulator encodes the data image to be retrieved by the encoding method to display it in at least one retrieval data block of the retrieval data page used to modulate the signal beam in the step of modulating the signal beam.~~

2. (Currently Amended) The ~~hologram retrieval~~ method according to claim 1, wherein

all pixels in the data blocks of the ~~retrieval search~~ data page other than the at least one ~~retrieval search~~ data block are OFF pixels.

3. (Currently Amended) The ~~hologram retrieval~~ method according to claim 1, wherein

one data block ~~in of~~ each data page ~~in of~~ the holographic recording medium is employed as a dedicated ~~retrieval search~~ data block, and an encoding method is used to provide ~~block having~~ a larger number of ON pixels in a data image formed in the dedicated ~~retrieval data block than for data images of than~~ the other data blocks of the data page.

4. (Currently Amended) The ~~hologram retrieval~~ method according to claim 2, wherein

one data block in each data page ~~of in~~ the holographic recording medium is employed as a dedicated ~~retrieval search~~ data block, and an encoding method is used to provide ~~block having~~ a larger number of ON pixels in a data image formed in the dedicated ~~retrieval data block than for data images of than~~ the other data blocks of the data page.

5. (Currently Amended) The ~~hologram retrieval~~ method according to claim 1, further comprising:

adjusting a beam diameter and an optical path of the signal beam such that the signal beam passes substantially only through the at least one ~~retrieval search~~ data block displayed on the spatial light modulator.

6. (Currently Amended) The ~~hologram retrieval~~ method according to claim 1, wherein

the encoded data image to be retrieved is sequentially displayed on the at least one ~~retrieval of the data block~~ blocks of the search data page in the spatial light modulator.

7. (Currently Amended) The ~~hologram retrieval~~ method according to claim 2, wherein

the encoded ~~data~~ search image ~~to be retrieved~~ is sequentially displayed on the at least one ~~retrieval of the data block~~ blocks in the search data page of the spatial light modulator.

8. (Currently Amended) The ~~hologram retrieval~~ method according to claim 1, wherein

the encoded ~~data~~ search image ~~to be retrieved~~ is displayed at the same time in all of the data blocks in the ~~retrieval~~ search data page used by the spatial light modulator.

9. (Currently Amended) A ~~hologram retrieval~~ method for searching holograms comprising the steps of:

generating a signal beam;

modulating the signal beam by a spatial light modulator using a ~~retrieval~~ search data page having a plurality of equally sized data blocks, a same search image being encoded into each data block of the search data ~~including a data image to be retrieved;~~ page;

irradiating the modulated signal beam onto a holographic recording medium having digital information recorded thereon in the ~~form of data pages, each data page formed of a two-dimensional bit map image,~~ each data page being multiplexed to transmit a diffracted ~~beam;~~ beam when irradiated by a light beam, each data page comprising a plurality of equally divided data blocks;

receiving one or more diffracted beams emitted from the holographic recording medium;

detecting a target diffracted beam having a maximum intensity of the one or more diffracted beams; and

determining ~~a data image~~ an address of the target diffracted beam as ~~the data image~~ an address of a target data ~~image~~ page,

wherein ~~the data pages are formed of a plurality of equally sized data blocks, each data block recorded in the holographic recording medium containing contains~~ a data image formed by an encoding method that provides a different number of ON pixels for each data ~~block, and block~~.

~~the spatial light modulator encodes the data image to be retrieved by the encoding method in all of the data blocks of the retrieval data page used to modulate the signal beam in the step of modulating the signal beam.~~

10. (Currently Amended) The ~~hologram retrieval~~ method according to claim 1, further comprising:

generating a reproduction reference beam to retrieve the target data page; and
irradiating the holographic recording medium by the reproduction reference beam to reproduce ~~retrieval information~~ the target data page.

11-12. (Canceled)

13. (Currently Amended) The ~~hologram retrieval~~ method according to claim 8, further comprising:

generating a reproduction reference beam to retrieve the target data page; and
irradiating the holographic recording medium by the reproduction reference beam to reproduce ~~retrieval the information~~ target data page.

14. (Currently Amended) The ~~hologram retrieval~~ method according to claim 9, further comprising:

generating a reproduction reference beam to retrieve the target data page; and

irradiating the holographic recording medium by the reproduction reference beam to reproduce ~~retrieval information~~ the target data page.

15. (Currently Amended) A holographic recording and reproducing apparatus comprising:

an object optical system that directs an object beam to a holographic recording medium having a hologram recorded ~~thereon~~; thereon, the hologram comprising a plurality of data pages each storing digital information, each data page being separately retrievable;

a reference optical system that directs a reference beam to the holographic recording medium;

a spatial light modulator provided in the object optical system that displays ~~to be retrieved~~ a search digital information in at least one retrieval data block of a retrieval data page, the retrieval data page including a plurality of data blocks, including the at least one retrieval data block, the data blocks of the search data page being equally sized with each other, the spatial light modulator encoding search information into at least one data block of the search data page, wherein the object optical system modulates/modulating the object beam by the to be retrieved search data page;page having the encoded search information;

a ~~retrieval~~ search imaging device for receiving a plurality of diffracted beams produced by the holographic recording medium when the holographic recording medium is irradiated with the modulated object beam output from the object optical system;

a signal processing circuit for processing an output signal from the ~~retrieval~~ search imaging device, and that identifies an address of a target data page containing the ~~to be retrieved digital information~~ encoded search information as an address corresponding to a diffracted beam having a maximum intensity of the plurality of diffracted ~~beams~~ beams; and

a reproduction imaging device for receiving a diffracted beam produced by the holographic recording medium in response to irradiation with a reproduction reference beam from the reference optical system, ~~wherein:~~system.

~~the spatial light modulator i encodes the to be retrieved digital information in the at least one retrieval data block of the retrieval data page.~~

16. (Currently Amended) The holographic recording and reproducing apparatus according to claim 15, wherein

the spatial light modulator is configured such that all pixels in the data blocks of the retrieval search data page other than the at least one ~~retrieval data block~~ of the search data page in which the ~~to be retrieved digital search~~ information is displayed are OFF pixels.

17. (Currently Amended) The holographic recording and reproducing apparatus according to claim 15,

wherein the spatial light modulator ~~is designed such that~~ employs one of the data blocks in each data page ~~is employed as a dedicated retrieval search data block, and and,~~

for each data page, an encoding method is used to provide a larger number of ON pixels for a data image formed in the dedicated retrieval search data block comprises a data image having a larger number of ON pixels than for any data images in the other data blocks of the data page.

18. (Currently Amended) The holographic recording and reproducing apparatus according to claim 16,

wherein the spatial light modulator ~~is designed such that~~ employs one of the data blocks in each data page ~~is employed as a dedicated retrieval search data block, and and,~~

for each data page, an encoding method is used to provide a larger number of ON pixels for a data image formed in the dedicated retrieval search data block comprises a data

image having a larger number of ON pixels than for any data images in the other data blocks
of the data page.

19. (Currently Amended) The holographic recording and reproducing apparatus according to claim 15,

wherein the object optical system is configured such that a beam diameter and an optical path of the signal beam can be adjusted so that the signal beam passes substantially only through the at least one ~~retrieval~~-search data block displayed on the spatial modulator.

20. (Currently Amended) The holographic recording and reproducing apparatus according to claim 15,

wherein the spatial light modulator is configured such that the ~~to-be-retrieved digital~~ search information can be sequentially displayed on the plurality of ~~retrieval~~-data ~~blocks~~-blocks of the search data page.

21. (Canceled)

22. (Currently Amended) The holographic recording and reproducing apparatus according to claim 15, wherein:

the spatial light modulator is configured such that the ~~to-be-retrieved digital~~ search information can be displayed at the same time in all of the data blocks in the ~~retrieval~~-search data page of the spatial light modulator.

23. (Currently Amended) A holographic recording and reproducing apparatus comprising:

an object optical system that directs an object beam to a holographic recording medium having a hologram recorded thereon;

a reference optical system that directs a reference beam to the holographic recording medium;

a spatial light modulator provided in the object optical system that displays to-be-recorded digital information as a to-be-recorded data image in at least one of a plurality of data blocks of a retrieval-search data page, ~~the retrieval data page being formed of a two-dimensional bit map image, the retrieval data page including the plurality of data blocks,~~ the data blocks being equally sized with each other, wherein the object optical system modulates the object beam by the to-be-recorded digital information;

a retrieval-search imaging device for receiving a plurality of diffracted beams produced by the holographic recording medium when the holographic recording medium is irradiated with the modulated object beam output from the object optical system;

a signal processing circuit for processing an output signal from the retrieval-search imaging device, and for identifying an address of a target data block and a target data page corresponding to the diffracted beam having a maximum intensity of the plurality of diffracted beams; and

a reproduction imaging device for receiving a diffracted beam produced at the time of irradiation with a reproduction reference beam from the reference optical system, wherein

the spatial light modulator encodes the to-be-recorded data image by an encoding method to generate the to-be-recorded digital information, the encoding method provides a different number of ON pixels for each data block of a data page.